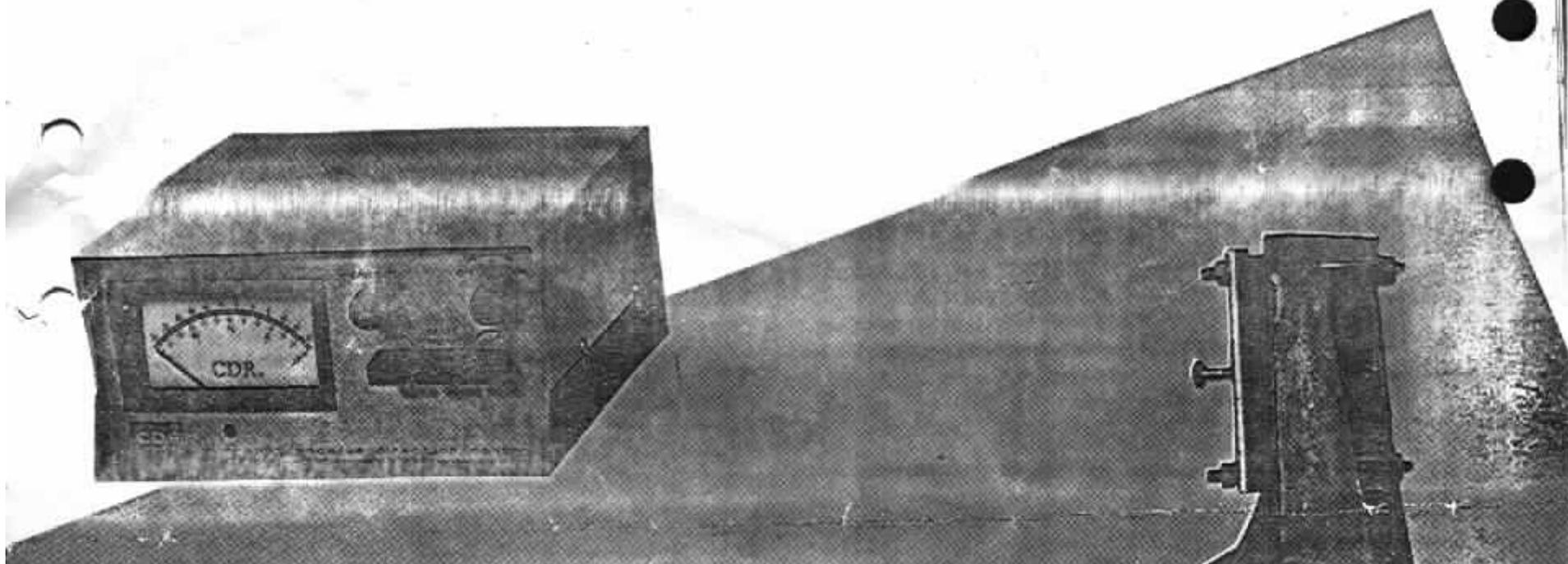


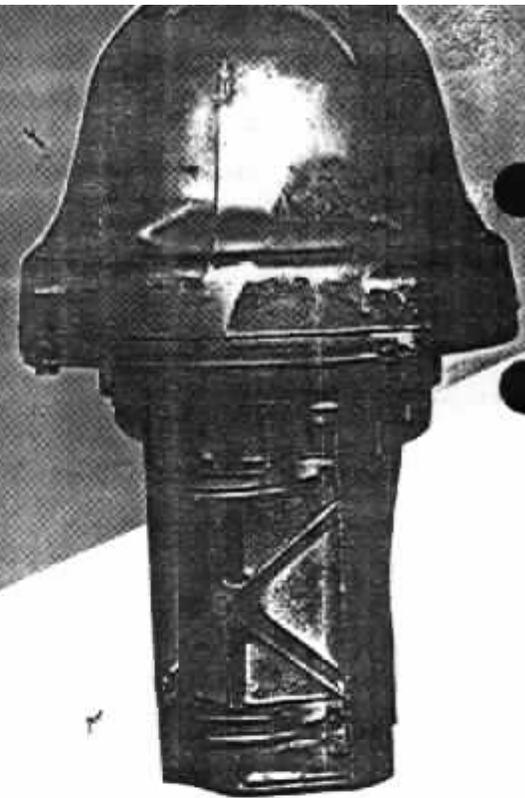
**CLASS 252-45**

**CDE CD-44  
ROTOR SYSTEM**



# OWNER'S MANUAL

CORNELL-DUBILIER HAM II ROTATOR  
IS RECOMMENDED FOR ANTENNA ARRAYS  
LARGER THAN 2.5 SQUARE FEET OF  
EXPOSED FACE AREA.



**CORNELL-DUBILIER ELECTRONICS**  
DIVISION OF FEDERAL PACIFIC ELECTRIC COMPANY  
Rotor Department  
Fuquay-Varina, North Carolina

## Foreword

On the following pages, you will find information obtained from the Engineering Staff where the CDR Rotors are built or the Rotor Engineering Group. No attempt has been made to detail every possible installation or suggest every maintenance procedure that may be necessary to cover many years of operation. Please feel free to communicate with us at any time that we may be of assistance. Write to:

### CORNELL-DUBILIER ELECTRONICS

Division of Federal Pacific Electric Company

CDR Rotor Department

Fuquay-Varina, North Carolina 27526

Telephone: 919-552-2281

## General

The CD-44 rotor system is designed to accommodate light amateur and C.B. antennas with a maximum of 2.5 square feet of wind area. The CD-44 provides a full 360° range of rotation and a meter scale read out for accurate position indication.

The CD-44 is built along the general lines of the original CDE bell type rotator. The weight of the upper mast and the antenna is carried directly in line with the lower supporting mast. The motor, radial and thrust bearings, armature/disc brake, gear train, and indicating sensor are built into the elongated bell shaped cast aluminum housing.

The CD-44 brake is a disc type built into the bottom portion of the motor armature. With the motor at rest, no power applied, the disc brake is engaged by virtue of the weight of the motor armature. When power is applied to the motor, the armature lifts approximately .80 mm (.031") and releases the disc brake.

Terminal 2 on the control unit is not required when used with the CD-44 rotator. This terminal is for the brake solenoid when the control is used with a Ham-II rotator. However, we suggest attaching the #2 control wire to this terminal in order not to leave a loose wire which could short to another terminal.

## Control Unit Versatility

The Ham-II/CD-44 control unit is designed for operation with the Ham-II rotator, part number 50232-00, or the CD-44 rotator, part number 50241-00. If your system demands a larger antenna at a later date, the CD-44 system can be changed to a Ham-II system simply by replacing the rotator

## Pre-Installation Check

It is recommended that a preliminary operational check be made on the system prior to actual installation.

Check each item of the system for physical damage due to shipping. The CD-44 system consists of a control unit, a bell rotator unit, a lower mast support, a hardware package and a service manual. If any of these items are missing or damaged, return the complete system to your dealer or the factory for replacement. Sales receipt must accompany such a return.

After the physical check of the equipment, set up the control unit and the Bell rotator for an electrical check. We recommend the following procedure:

1. Measure out the maximum 8-wire control cable required for your particular installation. (See spec. table) Strip the insulation from all wires, separate the individual wires back about 2-3 inches, and tightly twist the stranded ends. Soldering these ends improves manageability.
2. With the control unit and the rotator on the work table, connect the cable between the two units. Make sure wires 1, 2, 3, 4, 5, 6, 7, and 8 on the control unit are to 1, 2, 3, 4, 5, 6, 7, and 8 on the rotator respectively.  
CAUTION: No loose strands of wire should touch adjacent terminals or other metal parts of the units.
3. With the rotator sitting in the upright position and connected to the control unit, by the eight (8) wire cable, plug the control unit power cord into a convenient 115 Vac 50/60 Hz wall socket.
4. Turn the power switch on. The meter should be illuminated.
5. Depress the brake release, hold, and simultaneously depress the clockwise direction switch (right). The rotator should turn clockwise (looking from top). This is S-W-N-E-S. Release the direction switch; rotator will coast down and stop. Now release the brake. The rotator is now locked into position.

CAUTION: It is best to release the direction switch prior to end of rotation (extreme clockwise or counterclockwise position) in order not to damage the stop arm and/or the gears.

The rotator is now stopped and the brake is engaged. To turn the rotator counterclockwise, release the brake, hold, and si-

unit. The Ham-II rotator unit, less hardware and lower mast support, is priced at \$82.95 and may be obtained from a dealer or the factory.

The CD-44 rotator will handle antennas with up to 2.5 square feet of wind area. The Ham-II rotator will handle up to 7.5 square feet of wind area and has a positive electrically operated wedge brake.

**Repair Service**

Cornell-Dubilier maintains a modern well staffed repair department for all CDE antenna rotors. If service is required, the unit should be packed securely and sent prepaid to:

Cornell-Dubilier Electronics  
Rotor Service Department  
118 East Jones Street  
Fuquay-Varina, N. C. 27526

For units that are in warranty, no charge will be made for repair. If the unit is out of warranty, the following flat rate charges apply:

- Control box only .....\$12.00
- Rotator only .....\$15.00
- Complete unit .....\$25.00

A check or money order for the amount indicated above should be included. The flat rate charge includes rebuilding the unit and replacing all defective parts.

multaneously depress the counterclockwise switch (left). The rotator will turn counterclockwise. This is S-E-N-W-S.

Prior to actual installation, check the calibration to familiarize yourself with this procedure. It is best done while the system is still set up for the Pre-installation check.

**Meter Calibration**

Rotators are shipped from the factory stopped in the full counterclockwise (South) position. To calibrate the meter, have the rotator full counterclockwise position, on-off switch "off" and use the zero-center screw to line the needle on the left hand "S" limit. With the on-off switch in the "on" position, push in the calibrate knob and turn while in the depressed position to locate the needle on the right hand "S" limit. This meter calibration can be performed any time it is desired to check the accuracy. When power is off, the needle will fall to the left hand "S". When power is on, the needle will indicate the antenna position. The zener regulated meter supply will minimize reading variations due to line voltage fluctuations.

**Rotator Installation**

The CD-44 rotor is shipped from the factory at counterclockwise end of rotation south when viewed from top of rotor.

Install rotor as it comes from factory and point beam south in such a manner that when rotator starts rotating clockwise to other end of rotation the lead wires will not foul.

Wire up the rotator and control box and plug in unit. Meter should read south on left side of dial.

*it will RGS*

The CD-44 is engineered to handle light amateur and C.B. antennas. Long and trouble free performance of the system depends on making the installation to properly handle the stresses involved. CAUTION: THE ROTATOR IS DESIGNED FOR VERTICAL OPERATION WITH THE BELL SHAPED HOUSING IN THE UP POSITION. Water and other contamination will get into the motor unit if mounted horizontal or up-side-down.

**Unbalanced**

creates a bending moment of force which is concentrated on the mast of

1. The center-of-gravity and center of wind load force of the antenna should be as close to the top of the rotor casting as possible. One to three feet is practical with most installations. When the antenna with a boom length exceeding 8 ft. is to be mounted more than 5 ft. above the top of the rotor, use of a heavy duty tower with the rotor mounted inside is mandatory. The antenna support pipe then should be 2 inch O.D. steel with  $\frac{1}{4}$  inch wall, rotating in a ball-thrust bearing at the top of the tower. The rotor should be mounted inside the tower within 4 feet of this bearing to minimize rotating whip in the tubing. All reliable tower manufacturers will be glad to advise the best method for inside mounting with their product. A rugged mount can be made easily with angle iron and "U" bolts that will fit any tower.
2. The CD-44 easily mounts on a pipe or top of tower, but certain precautions must be observed to obtain good service. The rotor can be subjected to tremendous leverage forces. The rotor can be subjected to tremendous leverage forces mounted in this manner, but the thousands of long term successful "top" installations prove its potential feasibility. A careful survey of hundreds of such installations points up several factors. The center-of-gravity and wind loading of the antenna must be centered over the rotor and not more than 12 inches above it if any part of the antenna array is more than 10 feet from the rotor. The reasoning behind this is simple. The ball-thrust bearing races in the base of the CD-44 are just over 6 inches in diameter. 50 lbs. exerted against a 10 ft. lever will place approximately 2,000 lbs. of "pinch" on these bearings. Each additional foot of leverage or pound of force multiplies this value by a high ratio. Extreme care should be used in any very high, top of clear hill installations. Here the wind forces may be applied at odd angles, such as, a severe up-draft that lifts one side of the antenna, multiplying leverage many-fold.
3. Ever effort should be made to eliminate any source of flexure in the mount or antenna. During even moderate breezes, such flexing can set up an oscillating motion that results in thousands of pounds of torque or bending moment. The two degrees of "lost motion" built into every CDE rotor acts as a vibration dampener but can only counteract for moderate swing. After determining proper orientation of rotor and antenna, we suggest that a  $\frac{3}{8}$ " hole be bored through the tapped pilot hole in the upper and lower clamp plates—through the support mast—and out through the

## weight

the point where it is clamped to the top of the rotor. This moment tends to strain the mast at that point and also to bind the ball bearings by creating excessive downward pressure on one side and upward pressure on the other. Such unbalance places additional stresses on the motor and gear train. Unbalanced weight becomes critical as the distance from the antenna boom to the clamping point at the rotor is increased.

## Wind Pressure

against the boom and elements usually produces a bending force on the mast which causes the same stresses as unbalanced weight. To strengthen the installation to withstand unbalanced weight and wind pressure, the top mast should be as short as possible. In order to distribute the bending stress and prevent fracture of the mast, the CD-44 rotor includes two long, heavy, specially designed steel clamping plates. These are grooved to grip the mast securely. It is recommended that the mast be reinforced in the area where it is clamped by driving a hardwood dowel of proper size into the end of the mast.

## Mechanical Description

The motor drives a train of spur and pinion speed reduction gears which in turn drive the ring gear. The ring gear drives the bell shaped upper mast support, into which the antenna mast is mounted in rigid central alignment.

A boss is cast on the under side and in the center of the cavity of the upper mast support, which engages the serrated edge of the potentiometer arm which is mounted on the top of inner mechanism.

Maximum support and low frictional loss between the rotating upper mast support and the inner mechanism is assured by the use of two groups of 25 steel balls each riding in the bearing races between the two assemblies, and held in special nylon retainers.

Mechanical stops along with electrical limit switches are built into the rotor mechanism to provide accurate and complete 360 degree rotation.

## Circuit Description

Two transformers are mounted in the control unit. The power transformer supplies approximately 30 VAC for releasing the brake and operating the motor when control levers are depressed. Overheating of the transformer from prolonged operation or possible short circuit is prevented by a thermal cut-out switch in the primary winding.

"V" casting. Then run a  $\frac{3}{8}$ " stainless steel bolt and nut of the proper length, tighten securely, through the whole assembly. This is the only known method of insuring no slip at these two points.

4. To summarize: Successful operation of the CD-44 with moderate size antennas is assured if a proper mechanical installation commensurate with the total size of the entire system is made. Please do not attempt another "Easy" 10 ft. by attempting to mount an antenna of any size on top of a  $1\frac{1}{4}$  inch "T.V." mast on top of the rotor—you are just going to pick up pieces after the first wind gust! Do provide a good mechanically solid support for the rotor at the height desired for the antenna; then keep the center of gravity of the array close to the top of the rotor. If there is any doubt about a "Top" mount, then invest in a good inside tower installation; it is an excellent investment.

The motor is a two-phase device with the first winding being supplied AC direct from the transformer while the second has a 120-140 MFD. capacitor in series in order to shift the phase and provide forward rotational torque. To reverse, the capacitor is switched in series with the first winding, while the second is directly supplied from the transformer.

The meter transformer is energized as the on-off control is switched to the "on" position. This illuminates the meter dial and the meter indicates the position of the antenna. 13 VDC is supplied to the 500 OHM potentiometer in the rotator through a zener regulated supply.

The meter is a high quality DC instrument requiring 1 MA for full scale deflection. It is connected with plus side through the 10 K multiplier to the plus side of supply and potentiometer, which is protected by a  $\frac{1}{8}$  AMP fast blow fuse. The meter

circuit is completed through the 5000 OHM calibrate control and operate/calibrate switch to ground. The operate/calibrate control is located on front panel. With the zener controlled supply the 5K calibrate control will be set at approximately 3000 OHMS which will give 13,000 OHMS in series with meter to allow for 1 MA deflection at full scale.

Two electrical limit switches in the rotator cut the motor power just before the rotation reaches the extremes. A fuse, located on rear panel is also included on one side of the AC power line.

### Servicing the Control Unit

Disconnect the AC power source and remove the eight wire control cable. Be sure to tag each wire with the corresponding terminal number.

pose potentiometer and drive mechanism.

3. Carefully remove upper ball retaining ring. Keep it circular, and lay it on clean paper.
4. Inspect inside of top housing for small scratches or burned spots on the ribs. These are an indication that a switch blade or connection is rubbing during rotation. See that the pot strip is clean and not burned at either end. See that pot body is secure and that pot arm is clean at the point of contact. Use only fine rouge cloth to polish contact arm. Check limit switch to see if wires are secure and insulation is undamaged. Contacts should be clean. Check for  $1/32$ " clearance between switch blades and motor—particularly alongside of lockwasher under motor fastening. Greater clearance sets switch too close to top ball

The control box can be checked without removing the cover by using a volt-ohmmeter to check values across terminals. Resistance across terminals #1-2 should read .4 Ohms. Read same value across terminals #1-5 with clockwise switch lever (right-hand) depressed and across terminals #1-6 with counter-clockwise switch lever (left-hand) depressed. Resistance across input line cord with on-off switch in the "on" position and the brake lever depressed should read 3.8 Ohms.

With power cord connected and on-off switch in the "on" position and brake release lever depressed read approximately 30 VAC across terminals #1-2. With on-off switch in "on" position read 13 + 10% VDC across terminals #3-7.

The electrolytic motor capacitor must be of proper value to give adequate motor torque. If a new capacitor is not available for check by substitution, a quite reliable check may be made using the power transformer in the control box and an auxiliary 1 Ohm 10 Watt resistor.

To make this capacitor check, remove cable from terminals and tie terminal #2 to #4. Connect one end of resistor to #1 and the other end to #8. Turn off-on switch to "on" position and depress brake release lever. If capacitor is OK it will draw sufficient current to cause a voltage drop of 1.4 to 1.6 volts to be present across the resistor. Measure with an AC voltmeter.

### Checking the Rotator from the Ground

One may possibly avoid bringing the rotator down from the mast by making electrical checks from the position of the control box. This is done by disconnecting the eight wires from the screw terminals and tagging them carefully #1 through #8 to correspond with the terminal numbers from which they are removed. From the schematic diagram it is apparent that the resistance of the lead wires will be added to the resistance of the motor windings and potentiometer strip in making the resistance checks.

Lead #1 of #18 AWG has approximately 0.64 Ohm resistance per 100 feet and leads #3 through #8 of #22 AWG have approximately 1.6 Ohms resistance per 100 feet. Use a low resistance ohmmeter to check the values shown in the table below to an accuracy of 10 percent after adding the resistance of the leads involved.

To Check	Resistance	Between Terminals
½ Motor Winding	1.5 ohms*	1-8
½ Motor Winding	1.5 ohms*	1-4
½ Motor + Switch	1.5 ohms*	1-5

5. If the drive ring happens to be near end of rotation, operate the top spur gear to rotate the mechanical stop on the drive ring away from the area of the limit switch. See that the mechanical stop lever (which is positioned between the two limit switches) will open each electrical contact before it hits the corresponding mechanical stop. Also see that the stop lever has not been deformed and that the electrical contacts are clear and uncorroded.
6. Rotate the top spur gear several revolutions to determine that the motor and its bearings are operating freely. Look for broken teeth in any of the gears.
7. Remove the drive ring gear from the base housing. This is accomplished by first pulling up on the side opposite the gear train. Then raise the entire ring slightly upward with the side away from the gear train higher so that it will slide out from under the gears. Examine closely for evidence of broken or worn teeth.
8. Examine the inside of the screw terminal strip to see that there is proper clearance between the solid lugs and frame and that there are no faults in the insulation. Pay particular attention to the insulation at the point where the wires are held in metal clips.
9. To remove potentiometer, remove hex nuts. Unsolder leads. Mounting studs are staked to the motor frame. Be sure that the pot strip is clean and that pot arm is not corroded. Use only fine rouge cloth as an abrasive. In replacing the pot be sure the connections are on the side which overhangs the motor.
10. To replace the motor, first remove the pot per Paragraph 9, then unsolder black motor lead if not done in step 9, the red lead from the inside left limit switch lug, and the blue lead from inside right limit switch lug. Fastenings holding motor on studs may then be removed and the motor pulled up and out. In replacing a motor, be sure to see that the round hole in the motor is next to the limit switch. Use special internal-external lockwasher over the stud that works in the slotted hole in the motor. Be sure that the pinion is snug against the spur gear before tightening this fastening over the slot.
11. When it is necessary to closely inspect or replace gears, it is possible to remove motor, limit switch, pot, and terminal strip without unsoldering. Remove motor fastening from the mounting studs. Work motor up and out, exercising care in pulling leads and terminal strip through the

½ Motor + Switch	1.5 ohms*	1-6
Entire Motor	3.0 ohms*	4-8
Right Limit Switch	0 ohms + leads	8-5
Left Limit Switch	0 ohms + leads	4-6
Entire Pot Strip	500 ohms	3-7
Pot Arm to + End	0 to 500 ohms	1-3
Pot Arm to — End	0 to 500 ohms	1-7
	* plus leads	

## Disassembly of Rotator

1. Remove the bottom mast support to permit the rotator to be set on a flat bench.
2. Remove four screws and carefully raise top casting to ex-

Page Four

Excessive grease will only run out in high temperatures or cause power loss in low temperatures.

2. Rotate upper spur gear until the inwardly protruding mechanical stop on the right gear engages the channel shaped stop lever and pushes it far enough to the right to just open the right hand limit switch contact (it is assumed that the rotator is viewed from the side of the limit switch). This situation represents the extreme counterclockwise end of rotation. The potentiometer arm must then be rotated to its extreme counterclockwise position against the top brass stop.
3. Secure the upper bell housing upside down by the mast support in a vise with the open end of the "V" toward the bench. The boss which drives the potentiometer arm which is located in the bottom part of the bell housing will then be to the left of center.
4. Clean the inner portion of the housing and apply a small amount of grease to the ball race. Then carefully insert one ball bearing assembly with the flanged rim up and against the outer edge of the casting.
5. Grasp the operating mechanism by the flat base, steady the ring gear, invert the mechanism and lower it into the housing. In doing this, note that the serrated portion of the potentiometer arm must engage the driving boss in the housing and that the three driving lugs on the ring gear must engage the mating lugs in the top housing. This

window in the gear housing. Remove plate to expose gears. Carefully note positions for proper replacement.

## Reassembly of Rotator

- It is assumed in the following instructions that the motor and gear train along with potentiometer and limit switch are likewise assembled and wired and operative.
1. See that a small amount of low temperature, high quality, light weight grease is conservatively distributed around the ball bearings, ring gear, and spur gears. Only an even film of grease is desirable (approximately one thimbleful of grease should be used to lubricate a completely dry rotator).

officially." Check the nuts on the U bolts that they are tight. Also check that the center bolt in the mast clamp is tight.

## Lack of Power

so that antenna rotation is slow or sluggish. Use method on page four to check motor from ground. Check the capacitor. Check transformer for AC output. If the electrical circuit is OK, then check for mechanical binding. Pay particular attention to bearings and alignment of shaft on an inside tower mount. As a last resort, dismantle the rotor to check gears, bearings, etc.

## No Meter Indication

The motor operates independent of the indicating system. If the pilot lights burn at proper brilliancy, the instrument transformer is OK and output is not shorted. Check for about 21 VDC across terminals #3 and #7 with switch operated. If this is present, check for 500 ohms across these leads to rotor (disconnected at control box). If 500 ohms is present from #3 and #7, see if the readings from #3 to ground and #7 to ground total 500 ohms. If this is so, connect an auxiliary meter from terminal #3 to ground and see that voltage runs from zero to about 21 volts as antenna is rotated from left to right extremes.

## No Rotation — No Indication

Either the thermal cutout in the power transformer has opened to protect the motor or capacitor from excessive

situation will result automatically if the previous instructions have been followed.

6. Determine that the top bearing surface is clean and apply a film of grease on the top ball race and the top bearing assembly. Then apply the top bearing assembly to the race with the rim downward.
7. Clean the retaining ring and apply a light film of grease to the ball race only. Lower the retaining ring into place so that the assembly holes will approximately line up with the threaded holes in the upper housing. Insert the 4 assembly screws and use a heavy screwdriver to completely tighten the 4 assembly screws. Torque to 85 inch pounds.
8. It is suggested that all 8 wires be connected from the control box while the rotor is still on the bench and that its complete operation be checked.

### Trouble Shooting

Field experience has shown that most operational difficulties with the rotor are traceable to broken, shorted or grounded wires—usually at the terminal strips. Time spent in cutting the leads to exact lengths, tinning, forming, and wrapping around terminals, cutting insulation to exact length, and clamping to prevent strain on any single wire, will pay big dividends later in long and trouble-free performance. Put it up right—and leave it up!

Should trouble occur, first follow the suggestion on page four for "Servicing Control Unit" and "Checking Rotator From Ground". Compare resistance values with Schematic Diagram to localize trouble. The following "symptoms" and "treatments" may also be helpful.

### Mechanical Play

To prevent binding under adverse operating conditions, a small amount of play is designed into the rotor. Even a degree or so of rotary play will permit several inches movement at the end of a wide antenna boom, or at the tips of the elements. Frequently the slight motion of the antenna array in gusts of wind is due more to the natural flexing of the elements and masts than it is due to actual play in the rotor mechanism.

### Antenna Rotates in Heavy Wind

This is usually a matter of the mast slipping in the support. A false indication of suspected "slipping" can be obtained by comparing meter readings at different times when the beam has not been "rotated

the meter or separate from excessive heat of prolonged operation or there is actually trouble in the circuit. After allowing time for the thermal cutout to restore service, proceed with suggestions above for "lack of power".

### Grounded Leads

Grounds will burn out either the line fuse or the small fuse in the DC circuit. For full explanations, refer to Schematic. A ground on any of the AC leads #1, #4, #5, #6, or #8 is the same as grounding lead #3 which is common to the AC and DC system. If lead #3 is grounded, it shorts out part of the pot, so that as rotation progresses to the other end, the full DC voltage is applied across a decreasing portion until current becomes so high that it burns out. Note also that any grounds either put an overload on the power transformer which causes the line fuse to blow, or overload the rectifier circuit so that the  $\frac{1}{8}$  amp. fuse blows.

### Meter Fluctuation

An intermittent condition in any component in the rectifier or meter circuits within the control box, as well as in the cable or potentiometer circuit in the rotator itself can cause meter fluctuation or error. Possible causes of such trouble may be localized by placing a test DC meter across terminals #3 and #7 and comparing the action of the test meter with the panel meter.

If the test meter fluctuates along with the panel meter, either a component in the rectifier circuit is intermittently defective, or an intermittent trouble-ground is drawing excessive current. To further localize such a condition, leave the test meter on terminals #3-#7 and remove the corresponding leads to the rotator. This removes the load from the DC circuit so the test meter will show about 32 volts. The panel meter sensitivity will be cut about in half, so it will show about  $\frac{3}{4}$  scale. Fluctuation of the test panel meters will now point to trouble in the DC rectifier circuit. Fluctuation of panel meter only, will point to intermittent trouble in the meter, multiplier resistors, or the "cal." pot.

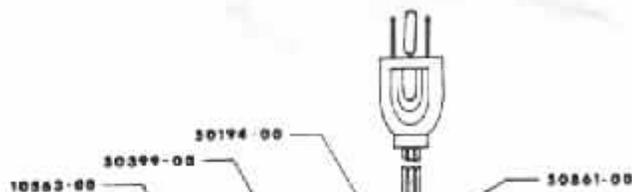
Where the meter is steady in preceding tests, and there is fluctuation with rotator leads connected, it indicates trouble in the lead wires or rotator itself. Any dirt, grease or corrosion that breaks or interferes with the ground return from the potentiometer slide will cause the needle to fluctuate from a true reading toward a center scale point. In such cases it is necessary to open the rotator per instructions on page 4.

# PARTS AND PRICE LIST

## CONTROL UNIT HAM - II/CD-44

50940-00 Control Unit, Complete (115 VAC)		\$79.95	PART NUMBER	DESCRIPTION	Quantity	Price Each	
PART NUMBER	DESCRIPTION	Quantity	Price Each				
<b>ELECTRICAL</b>							
10344-03	Fuse, 3 Amp, F-1	1	.18	50861-00	Line Cord, 3 Wire	1	1.50
10733-01*	Transformer, Power 115 VAC-Std on 50940-00	1	13.00	50883-00	Meter, Lamp Holder, and Bezel (N" Center)	1	23.10
10735-01*	Transformer, Power 220 VAC-Std. on 50941-00	1	13.00	50895-00	Bulb, Meter	1	.90
30112-05	Switch, Micro S-3, S4, & S-5	3	1.60	50899-00	Switch, On-Off, S-1	1	1.50
50040-00	Capacitor (120-140 Mfd.) C-2	1	1.65	50900-00	Switch, Calibration, S-2	1	4.80
50153-00	Diode, Zener, D-1	1	4.88	<b>SHEET METAL AND HARDWARE</b>			
50177-00*	Transformer, Meter 115 VAC-Std. on 50940-00	1	5.25	10555-00	Strip, Solder Terminal	1	.40
50183-00	Capacitor (30 MFD) C-1	1	1.31	10563-00	Holder, Fuse, F-1	1	1.50
50202-00*	Transformer, Meter 220 VAC-Std. on 50941-00	1	5.25	30362-05	Spring, Extension (Meter Bezel)	2	.20
50501-00	Diode, 100 Piv. D-2	1	.55	50185-00	Holder, Fuse, F-2	1	.42
50513-11	Resistor (10K Ohms 1/2W) R-1	1	.35	50187-00	Knob, Switch	2	.26
50513-12	Resistor (180 Ohms 1W) R-2	1	.35	50194-00	Clamp, Cable	1	.20
50563-00	Fuse, 1/8 Amp., F-2	1	.29	50300-00	Bumper, Rubber	4	.09
				50399-00	Strip, Terminal (8 Pin)	1	.40
				50884-00	Lever, Switch (Direction & Brake)	3	.30
				50885-00	Cover, Top (Tan)	1	3.10
				50886-00	Cover, Bottom (Brown)	1	3.00
				50890-00	Face Plate	1	2.75
				50891-00	Chassis	1	5.50

\*Note: 115 VAC control unit can be converted to 220 VAC by installation of the 220 VAC power and meter transformers.



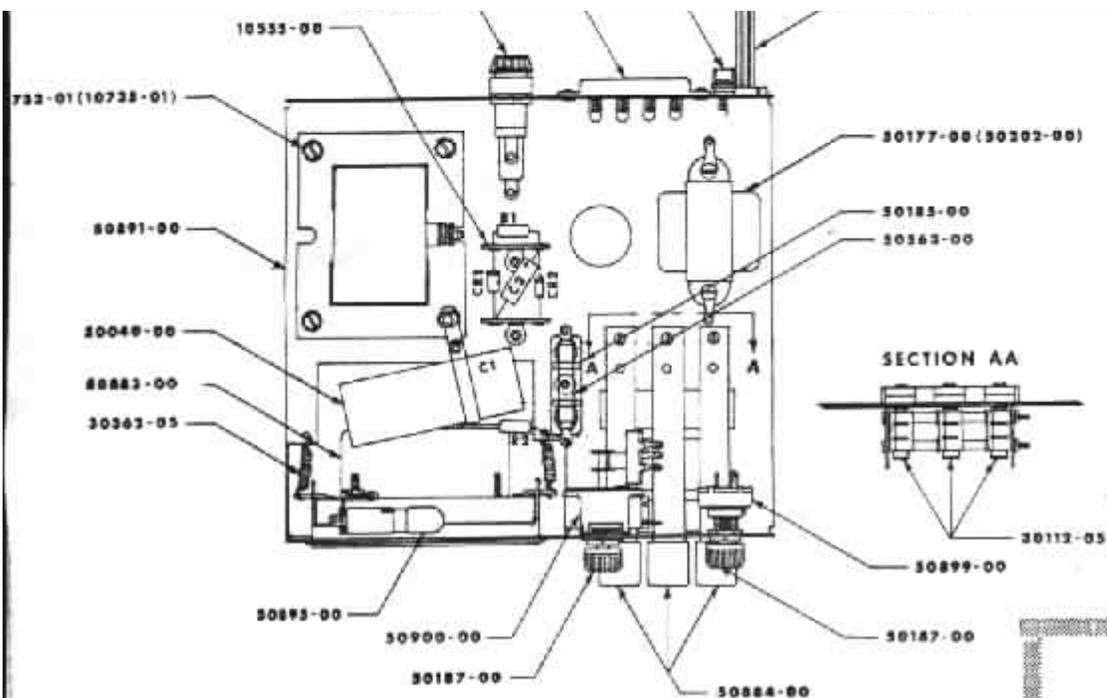


Figure 1

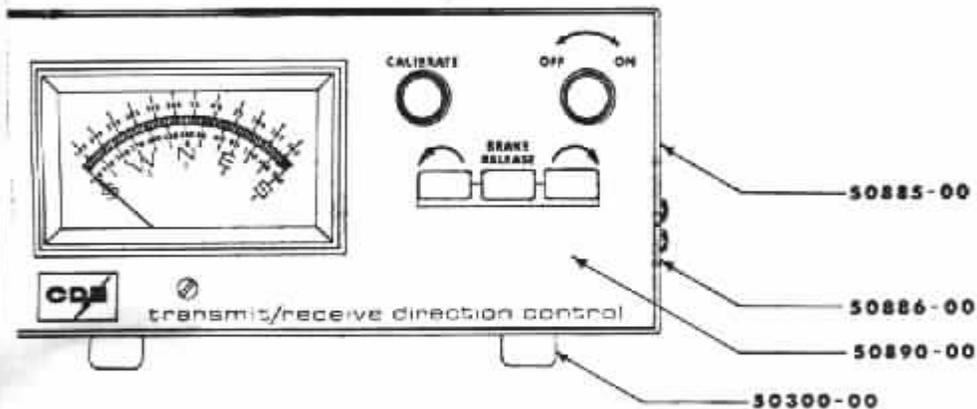


Figure 2

**ORDER PARTS USING COMPLETE NUMBER & DESCRIPTION**

To order parts, remit check or money order for total parts cost plus \$.50 for postage and handling to: Cornell-Dubilier Electronics, Department "C", 118 E. Jones Street, Fuquay-Varina, N. C. 27526

**WARRANTY**

CORNELL-DUBILIER ELECTRONICS warrants each new CORNELL-DUBILIER ROTOR to be free from defect in material arising from normal usage. Its obligation under this warranty is limited to replacing, or at its option repairing the rotor which, after regular installation and under normal usage and service, shall be returned within ONE (1) YEAR from date of original consumer purchase of the rotor to Cornell-Dubilier Electronics, Rotor Service Dept., 118 E. Jones St., Fuquay-Varina, N. C. 27526, together with satisfactory evidence of such purchase, and which shall be found to have been thus defective in accordance with the policies established by CORNELL-DUBILIER ELECTRONICS.

The obligation of CORNELL-DUBILIER ELECTRONICS does not include either the making or the furnishing of any labor in connection with the installation of such repaired or replacement rotor, nor does it include responsibility for any transportation expense.

**CONDITIONS AND EXCLUSIONS**

This warranty is expressly in lieu of all other agreements and warranties, expressed or implied, and CORNELL-DUBILIER ELECTRONICS does not authorize any person to assume for it the obligation contained in this warranty and neither assumes nor authorizes any representative or other person to assume for it any other liability in connection with such CORNELL-DUBILIER Rotor.

The warranty herein extends only to the original consumer and is not assignable or transferable, and shall not apply to any rotor which has been subject to alternation, misuse, negligence or accident.

CORNELL-DUBILIER ELECTRONICS  
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